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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/432,112	11/02/1999	TAKASHI TSUDA	837.1212/JDH	9637

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EXAMINER	
JUBA JR, JOHN	

ART UNIT	PAPER NUMBER
2872	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/432,112	Applicant(s) TSUDA ET AL.	
	Examiner John Juba	Art Unit 2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 August 2003*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 – 4, 15, 16, 25 – 28, 33 – 35, 47, 54, 59, and 60* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 – 4, 15, 16, 25 – 28, 33 – 35, 47, 54, 59, and 60* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

11-18-03

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 16, 47, and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kosaka, et al (U.S. Patent number 6,195,480; hereinafter, "Kosaka '480"), in view of Delavaux, et al. [The rejection stands as set forth in the last Office action (paper #20), and is repeated here only for convenience].

Referring *initially* to Figure 1 and the associated text, Kosaka '480 disclose a system for optical transmission adopting dispersion compensation, comprising

an optical fiber transmission line comprising a plurality of segments 7_n;

an optical transmitter (2_1) (5_1) for supplying an optical signal to said fiber transmission line;

an optical receiver (5_2) (4_2) for receiving said optical signal from the other end of said fiber transmission line;

an optical amplifier (6_n) between any two adjacent ones of said segments; and referring *for example* to Figure 4 and the associated text beginning in Column 8 (*esp.,* Col. 9, lines 30+),

a dispersion compensator (67_1) between a front-stage (63_1) and a rear-stage (68_1) amplifier of said optical receiver, there being

a plurality of O/E converters (23_n) connected to the output ports of a demultiplexer (75), which has its input port connected to said rear-stage amplifier.

The provision of amplifiers between fiber segments clearly conveys to the artisan that the segment lengths are limited in accordance with the available gain, the loss budget, and the noise budget. Thus, to one having ordinary skill in the art, Kosaka '480 fairly disclose segment lengths selected from a "predetermined" range, determined in advance, whereby these parameters have values consonant with an operative channel. Thus, Kosaka '480 disclose the invention substantially as claimed. However, Kosaka '480 do not disclose the dispersion compensator as providing a dispersion selected from a plurality of stepwise varying dispersions determined in accordance with said predetermined range, as recited.

In the same field of endeavor, Delavaux, et al disclose an optical transmission system having a plurality of segments in the transmission line. Delavaux, et al disclose a dispersion compensator that may be disposed in the optical receiver (Col. 4, lines 58 – 65). Delavaux, et al teach that the dispersion compensator may provide a dispersion selected from a plurality of stepwise varying dispersions (see for example, Figs. 5 – 7, 9, and 10). In one example, the *steps* are related as 1:2:4:8 (Col. 3, line 50 – 56). Delavaux, et al clearly teach provision of compensation in steps that collectively suffice

to compensate for dispersion encountered over the predetermined range of segment lengths.

It would have been obvious to one of ordinary skill to provide the dispersion compensator of Kosaka '480 in the form of a step-compensator, in the interest of permitting the dispersion amount to be varied, as suggested by Delavaux, et al. One of ordinary skill would have recognized the rather obvious advantage that adjustability provides in enabling a technician to optimize the network performance in the field.

Claims 1 – 4, 15, 16, 25 – 28, 33 – 35, 47, 54, 59, and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kinoshita, et al, in view of Delavaux, et al. [The rejection stands as set forth in the last Office action (paper #20), and is repeated here only for convenience].

Referring *initially* to Figures 1A/B and the associated text, and considering transmission from the "west end" in Figure 1A toward the "east end" in Figure 1B, Kinoshita, et al disclose

a system for optical transmission adopting dispersion compensation, comprising

an optical fiber transmission line comprising a plurality of segments "SMF";

an optical transmitter ("NODE"/"WMUXA" in Fig. 1A) for supplying an optical signal to said fiber transmission line;

an optical receiver ("WMUXB"/"NODE" in Fig. 1B) for receiving said optical signal from the other end of said fiber transmission line;

an optical amplifier ("OPTICAL REPEATER") between any two adjacent ones of said segments "SMF"; and referring *for example* to Figure 8 and the associated text (*esp.,* Col. 9, lines 3–10 and Col. 13, lines 29),

a dispersion compensator ("DCM") between a front-stage (4-4) and a rear-stage (4-5) amplifier of said optical transmitter (Col. 14, lines 2-20), there being

a plurality of E/O converters (OSW_n) connected, via variable attenuators ($VATA_n$), to the input ports of a multiplexer ("TWMA") which has its output port connected to said front-stage amplifier.

At the receive (east) end, the system further comprises

a dispersion compensator ("DCM") between a front-stage (6-4) and a rear-stage (6-5) amplifier of said optical receiver (Col. 15, lines 50-60), there being

a plurality of O/E converters (ORE_n) connected to the output ports of a multiplexer ("RWDB") which has its input port connected to said rear-stage amplifier.

The provision of amplifiers between fiber segments clearly conveys to the artisan that the segment lengths are limited in accordance with the available gain, the loss budget, and the noise budget (see *e.g.*, Col. 8, line 55 – Col. 9, line 2). Thus, to one having ordinary skill in the art, Kinoshita, et al fairly disclose segment lengths selected from a "predetermined" range, determined in advance, whereby these parameters have values consonant with an operative channel. Thus, Kinoshita, et al disclose the invention

substantially as claimed. However, Kinoshita, et al do not disclose the dispersion compensator as providing a dispersion selected from a plurality of stepwise varying dispersions determined in accordance with said predetermined range, as recited.

In the same field of endeavor, Delavaux, et al disclose an optical transmission system having a plurality of segments in the transmission line. Delavaux, et al disclose a dispersion compensator, which may be disposed in the optical transmitter and/or the optical receiver(Col. 4, lines 58 – 65). Delavaux, et al teach that the dispersion compensator may provide a dispersion selected from a plurality of stepwise varying dispersions (see for example, Figs. 5 – 7, 9, and 10). In one example, the *steps* are related as 1:2:4:8 (Col. 3, line 50 – 56). Delavaux, et al clearly teach provision of compensation in steps that collectively suffice to compensate for dispersion encountered over the predetermined range of segment lengths.

It would have been obvious to one of ordinary skill to provide the dispersion compensators of Kinoshita, et al in the form of step-compensators, in the interest of permitting the dispersion amount to be varied, as suggested by Delavaux, et al. One of ordinary skill would have recognized the rather obvious advantage that adjustability provides in enabling a technician to optimize the network performance in the field.

With regard to claims 2, 3, 26, 27, 34, 35, 59, and 60, Kinoshita, et al disclose operation at a center wavelength of about 1.55 μm in order to operate within the gain bandwidth of the erbium-doped fiber amplifiers used along the transmission line (Col. 1, lines 55-67), and clarify that the "SMF" discussed is a single mode fiber having a zero

dispersion wavelength at about 1.3 μm, whereby dispersion is introduced by virtue of operation at the longer wavelength (Col. 2, lines 47-60).

Response to Arguments

Applicants' amendment of the abstract is noted with appreciation as overcoming the previous objection to the specification for a lengthy abstract.

Applicants' remarks concerning the rejection of claims 16, 47, and 54 under 35 U.S.C. §103(a) as being unpatentable over Kosaka, et al (U.S. Patent number 6,195,480; "Kosaka '480"), in view of Delavaux, et al have been fully considered, but are not found persuasive. In Figure 1, Kosaka '480 disclose an optical communication channel comprising "terminal station repeaters" (5_n) and "intermediate repeaters" (6_n). While Applicants are correct that Kosaka '480 disclose a dispersion compensator (67_n) in the *intermediate* repeater of Figure 11 (see Col. 13, lines 31+, *esp.,* Col. 14, line 32), and while Applicants are correct that the *intermediate* repeater is different from an "optical receiving unit" (4_n), the examiner persists that Kosaka '480 also disclose a dispersion compensator (67_n) in each of the "station repeaters" (5_n), as shown in Figure 4. The passage identified by Applicants (Col. 10, lines 23 – 36) is actually a discussion of Figure 4, and Figure 4 is clearly disclosed as a detailed view of the *terminal* station repeaters (5_n) (Col. 8, lines 29 – 30).

Applicants' principal rebuttal turns on what one of ordinary skill would regard as "an optical receiver *for receiving said optical signal from the other end of said optical*

fiber transmission line" [emphasis added]. Insofar as the station repeater (5_2) and optical receiving unit (4_2) are connected to the other end of the fiber transmission line (7_3) and are "for receiving said optical signal", the examiner believes that the recited "optical receiver" fairly reads on the optical components of the station repeater (5_2) and optical receiving unit (4_2) in the received signal path, namely, demultiplexer (75) of MUX/DEMUX (12_2), front-stage (63_1), and a rear-stage (68_1) amplifiers of core amplifier (16), in combination either with the plurality of optical receivers (3_{m+1}, 3_{m+2}, 3_{m+3}, ...) of optical receiving unit (4_2) or the plurality of O/E converters (23_n), all connected to output ports of the demultiplexer (75). That is, in Figure 1, terminal station (2_1)(4_1)(5_1) can be regarded as comprising an "optical transmitter" (station) (2_1)(50)(25)(10_1)connected to one end (7_1) of the optical fiber transmission line, while the alternate terminal station can be regarded as comprising an "optical receiver" (station) (10_1)(16)(75)(23_n)(4_2) connected to the other end (73) of the optical fiber transmission line. Thus, the teachings of Kosaka '480 are believed *not* to be deficient in the manner relied upon by Applicants.

Applicants' characterization of Delavaux, et al as not suggesting placement of a dispersion compensator between front and rear stage amplifiers of a receiver amounts to a piecemeal evaluation of the reference. Delavaux, et al are not relied upon for this teaching. As set forth above, it is believed that Kosaka '480 provide this basic construction, and lack only a teaching of providing adjustability. Delavaux, et al then suggest that, where dispersion compensation is needed, it is desirable to provide compensation selected from a plurality of steps (increments). Thus, in light of the two

teachings, it is believed that one of ordinary skill would have found it obvious to render the dispersion compensator of Kosaka '480 in the form of a plurality of selectable steps of compensation, in the interest of providing the adjustability suggested by Delavaux, et al.

Applicants' remarks concerning the rejection of claims 1 – 4, 15, 16, 25 – 28, 33 – 35, 47, 54, 59, and 60 under §103(a) as being unpatentable over Kinoshita, et al, in view of Delavaux, et al, have been fully considered, but are not found persuasive. Again, Applicants' principal rebuttal turns on what one of ordinary skill would identify as "an optical receiver *for receiving said optical signal from the other end of said optical fiber transmission line*" [emphasis added] or "an optical transmitter *for supplying an optical signal to said optical fiber transmission line at one end of said optical fiber transmission line"* [emphasis added]. Applying a similar rationale, the examiner believes that, insofar as the plurality of E/O converters (OSW_n), variable attenuators ($VATA_n$), the multiplexer (MUXA) (3-1) of TWMA, and the front-stage amplifier (4-4), dispersion compensating module (DCM), and rear stage amplifier (4-5) of TWAA are connected to one end of the optical fiber transmission line (SMF) via coupler (4-7) for supplying an optical signal to the transmission line (Figs. 1A and 8), one of ordinary skill would regard this collection of components as comprising an "optical transmitter" within the specificity recited. In a like manner, since the front stage amplifier (6-4), dispersion compensating module (DCM) and rear stage amplifier (6-5) of RWAA, the demultiplexer (DMUXA) (7-1) of RWDA and plurality of O/E converters (ORW_n) are connected to the transmission line via coupler (6-6) for receiving said optical signal, the recited "optical

receiver" *reads on* these components. Accordingly, the disclosure of Kinoshita, et al is believed *not* to be deficient in the manner relied upon by Applicants.

Kinoshita, et al are thus believed to disclose the invention substantially as claimed, but lack a disclosure of the dispersion compensating modules (DCM) as providing compensation in steps (increments). Rather than being relied upon for a teaching of the placement of the dispersion compensating modules, Delavaux, et al are relied upon for a teaching of providing adjustability of dispersion compensating amount and for providing the adjustment in increments. The question of obviousness turns on what is fairly suggested to one of ordinary skill in light of the *combined* teachings of these two references. In the instant case, Delavaux, et al teach both the desirability of providing a means for adjustment, and teach that such an adjustment is conveniently and adaptively provided in the form of steps.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Onaka, et al (U.S. Patent number 6,351,323) disclose an optical transmission line comprising a plurality of fiber segments, there being an amplifier between at least two segments, and disclose a dispersion compensating unit between two amplifiers of the optical transmitter and a dispersion compensating unit between two amplifiers of the optical receiver (Fig. 31A). Onaka, et al disclose that the dispersion compensators in the transmitter and receiver can be the type providing dispersion compensation in steps (Figs. 33 – 38). This reference is available under 35 U.S.C. 102(e), is arguably

anticipatory, and is *commonly assigned*. Applicants are reminded of their duty of disclosure.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Juba whose telephone number is (703) 308-4812. The examiner can normally be reached on Mon.-Fri. 9 - 5.

On or about January 20, 2004, the examiner's new phone number is expected to be (571) 272-2314 at the Alexandria campus.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Drew Dunn can be reached on Mon.- Thu., 9 - 5.

The centralized fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306 for *all* communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

JOHN JUBA
PRIMARY EXAMINER
Art Unit 2872

November 10, 2003